

## Human Populations & Carrying Capacity

### Ecological Footprints 1

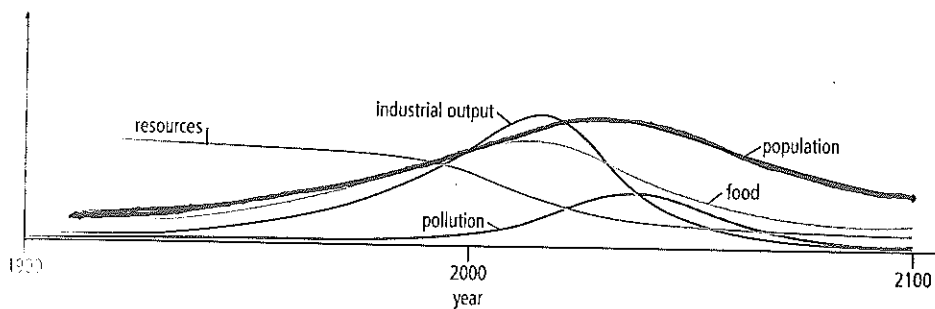
3.7.1 Explain the difficulties in applying the concept of carrying capacity to local human populations.

Limits to Growth Model • 1970 - By Club of Rome

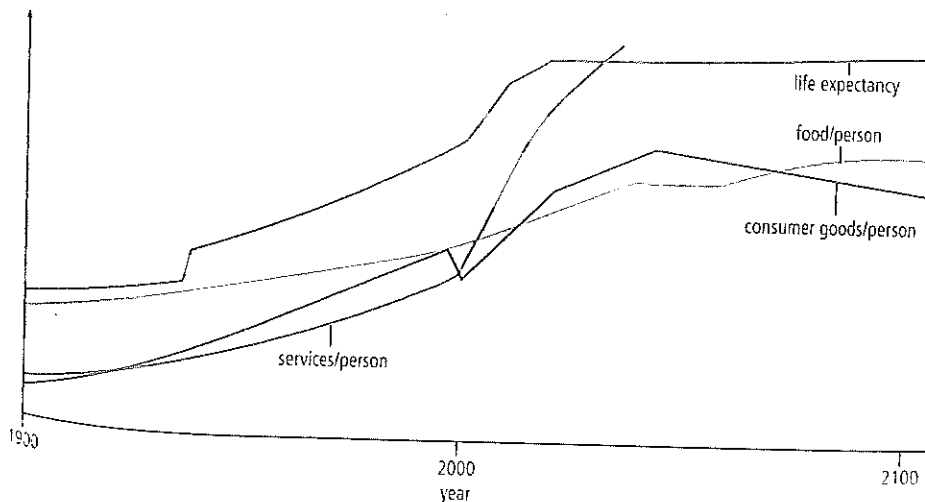
- Pop & Pollution will  $\uparrow$  after industrialization peaks
- Pop  $\downarrow$  when death  $\uparrow$  due to decreased food & medical

⇒ Present trends continue then: Limits to growth reached in 100 yrs.  
& then sudden & uncontrolled pop. decline &  $\downarrow$  industry.  
• Can still change trends towards a sustainable future.

Criticisms: ① World Model & doesn't distinguish bet. parts of the world.  
② Ignores spatial distribution of resources, pop, indust, & pollution  
③ Emphasizes Exponential growth & not rate of discovery of new resources & new users of resources.



1st Model  
from  
Club of  
Rome



2nd  
Sustainable  
Model

\* HARD TO est. human pop's carrying capacity because:

- Large range of Resources
- Humans substitute one resource for another when the 1st is limiting
- Lifestyle affects Resource Requirements.
- Tech. developments
- Resources can be imported.

CARRYING CAPACITY  
(again)

→ pop. size that an ecosystem can maintain.

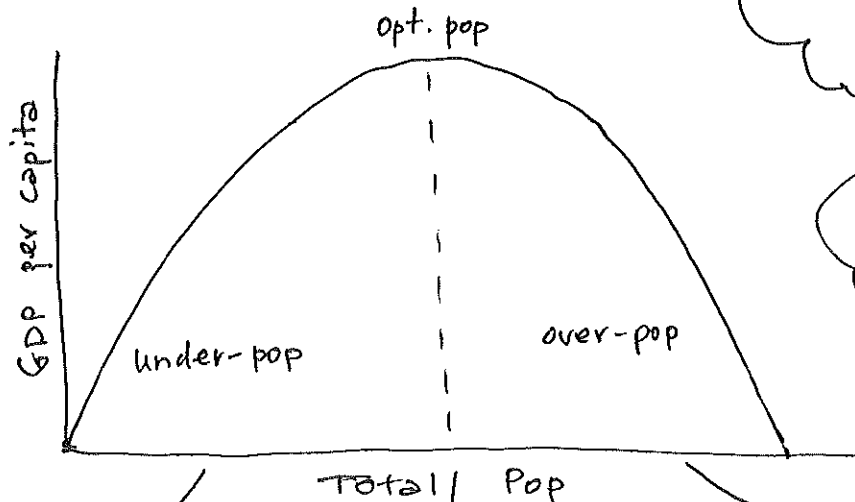
⇓  
"Population Ceiling"

pop = carrying capacity



↑ VERY HARD TO DETERMINE  
FOR HUMANS BC. WE  
KEEP CHANGING IT W/ TECHNOLOGY

Think about  
Optimum & Over- & Under-  
Population



GDP = Gross Domestic Product

per capita = per head

Far more resources in an area than people living there.

ex. CANADA

Optimum-pop.

# of people working w/ resources will produce highest per capita economic return.

Society has highest standard of living & quality of life

from here - either way standard of living will drop.

Too many people relative to resources & technology.  
ex. India, Bangladesh

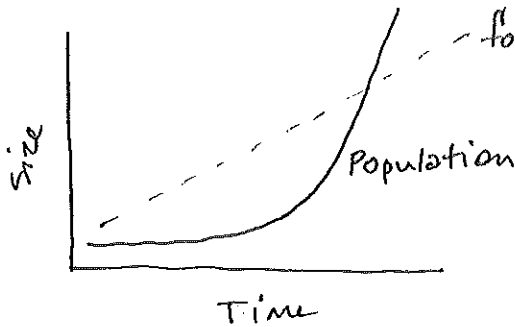
Very difficult to ID  
- depends on technology & social attitudes

# MALTHUS vs. Boserup

1960s

1798

- finite pop. size due to food production.



## Limitations

- Too simplistic
- Problems w/ distribution of resources NOT limits on production
- globalization means resources aren't "closed"
- green revolution & technology change food supply

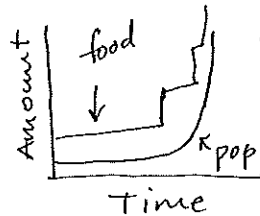
- As pop. increases so too will our tech. Knowledge → new solutions

- ↑ people in pre-indust. society (stage 1/2) Drove new Agricultural methods, more food

↳ IN REAL LIFE:

To improve Ag we:

- drain wetlands
- reclaim lands
- Selective Breeding of cattle & plants
- dev. of high yield crops
- terracing on steep slopes
- crops in greenhouses
- irrigation
- new foods
- Artificial Fertilizers
- Farming native orgs
- Fish Farming.



↑ Based on potential not actual growth.

- Malthus → 2 checks on pop. once pop. ceiling has been reached.

↳ Preventive √'s → no marriage, delay in marriage, abstinence from sex

↳ Positive √'s → lack of food, disease, war

↓  
But Industrial Revolution & Green Revolution

- ↑ human pop. growth
- ↑ food production

↑ Very Technocentric View of the World

## Limitations

- Also assumes a closed society No globalization.
- Lots of Immigration & Emigration
- Overpopulation can lead to unsustainable farming practices.

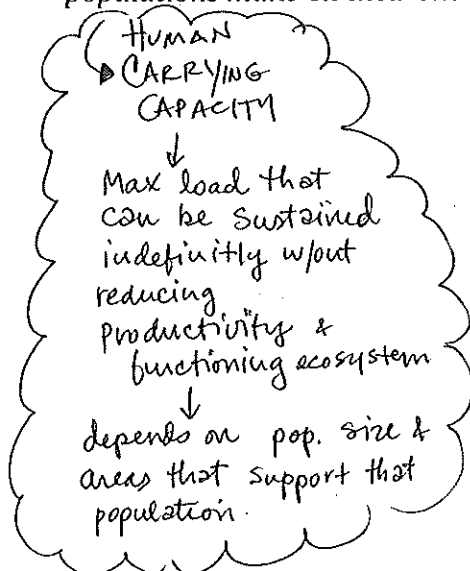
### 3.7.2 Explain how absolute reductions in energy and material use, reuse and recycling can affect human population carrying capacity

- ↓ in Energy use
- ↓ in Material use
- ↑ in reuse
- ↑ in recycling

↑ Human Carrying Capacity

- Reuse - obj. used more than once  
ex. Soft drink bottles, cans
- Recycling - obj. material used again to manufacture a new product.  
ex. Recycling Aluminum for some other object
- Remanufacturing - obj. material used to make same object.
- Absolute Reductions - Use fewer Resources  
ex. use less energy, less paper

### 3.8.1 Explain the concept of an ecological footprint as a model for assessing the demands that human populations make on their environment.



- Ecological Footprint depends on:
  - pop size
  - consumption rate/capita

↑ includes land use for just about everything.

area of land & water that would be required to sustainably provide a pop's resources & assimilate its wastes.

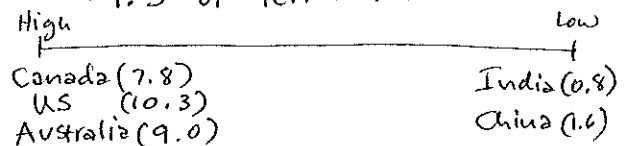
ECOLOGICAL FOOTPRINT is inverse of carrying capacity

↓

a quantitative estimate of carrying capacity

"A Fair Earthshare" → if the Earth was divided evenly this is the amount each person could get.

→ 1.3 of terrestrial land



all measurements in hectares